

> restart

PROBLEMA DINÁMICO

> EcuacionArco := Masa·diff(s(t), t\$2) == -Hooke·s(t)

$$EcuacionArco := Masa \left(\frac{d^2}{dt^2} s(t) \right) = -Hooke s(t) \quad (1)$$

> Hooke := $\frac{\left(\frac{11240}{1000}\right)}{\left(\frac{30}{100}\right)}$; gravedad := $\frac{981}{100}$; Peso := $\frac{16}{1000}$; Masa := $\frac{Peso}{gravedad}$; Largo
:= $\frac{615}{1000}$; Aire := $\left(\frac{228}{1000}\right)$

$$Hooke := \frac{562}{15}$$

$$gravedad := \frac{981}{100}$$

$$Peso := \frac{2}{125}$$

$$Masa := \frac{8}{4905}$$

$$Largo := \frac{123}{200}$$

$$Aire := \frac{57}{250} \quad (2)$$

> EcuacionArco

$$\frac{8}{4905} \frac{d^2}{dt^2} s(t) = -\frac{562}{15} s(t) \quad (3)$$

> Condiciones := s(0) == -(Largo - Aire), D(s)(0) = 0

$$Condiciones := s(0) = -\frac{387}{1000}, D(s)(0) = 0 \quad (4)$$

> SolucionImpulso := dsolve({EcuacionArco, Condiciones}); evalf(%, 3)

$$SolucionImpulso := s(t) = -\frac{387}{1000} \cos\left(\frac{1}{2} \sqrt{91887} t\right) \\ s(t) = -0.387 \cos(152. t) \quad (5)$$

> TiempoImpulso := solve(rhs(SolucionImpulso) = 0, t) : evalf(%, 3)
0.0104

> VelocidadSalida := subs(t = TiempoImpulso, rhs(diff(SolucionImpulso, t))) : evalf(%, 3);
 $\frac{\text{evalf}(\%, 3) \cdot 3600}{1000}$

$$\frac{58.8}{211.6800000} \quad (7)$$

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TIRO PARABÓLICO

> EcuacionVertical := diff(y(t), t\$2) == -gravedad

$$EcuacionVertical := \frac{d^2}{dt^2} y(t) = -\frac{981}{100} \quad (8)$$

$$> EcuacionHorizontal := \text{diff}(x(t), t) = VelocidadSalida \cdot \cos\left(\frac{\text{Pi}}{4}\right)$$

$$EcuacionHorizontal := \frac{d}{dt} x(t) = \frac{387}{4000} \sqrt{91887} \sqrt{2} \quad (9)$$

$$> CondicionesVerticales := y(0) = 2, D(y)(0) = VelocidadSalida \cdot \sin\left(\frac{\text{Pi}}{4}\right)$$

$$CondicionesVerticales := y(0) = 2, D(y)(0) = \frac{387}{4000} \sqrt{91887} \sqrt{2} \quad (10)$$

$$> CondicionesHorizontales := x(0) = 3$$

$$CondicionesHorizontales := x(0) = 3 \quad (11)$$

$$> SolucionVertical := \text{dsolve}(\{EcuacionVertical, CondicionesVerticales\}) : \text{evalf}(\%, 3)$$

$$y(t) = -4.90 t^2 + 41.3 t + 2. \quad (12)$$

$$> SolucionHorizontal := \text{dsolve}(\{EcuacionHorizontal, CondicionesHorizontales\}) : \text{evalf}(\%, 3)$$

$$x(t) = 41.5 t + 3. \quad (13)$$

$$> TiempoVuelo := \text{solve}(\text{rhs}(SolucionVertical) = 0, t) : \text{evalf}(\%, 3)$$

$$-0.07, 8.49 \quad (14)$$

$$> DistanciaMaxima := \text{subs}(t = \text{TiempoVuelo}_2, \text{rhs}(SolucionHorizontal)) : \text{evalf}(\%, 3)$$

$$355. \quad (15)$$

$$> TiempoAlturaMaxima := \text{solve}(\text{rhs}(\text{diff}(SolucionVertical, t)) = 0, t) : \text{evalf}(\%, 3)$$

$$4.21 \quad (16)$$

$$> AlturaMaxima := \text{subs}(t = \text{TiempoAlturaMaxima}, \text{rhs}(SolucionVertical)) : \text{evalf}(\%, 3)$$

$$89.7 \quad (17)$$

> x